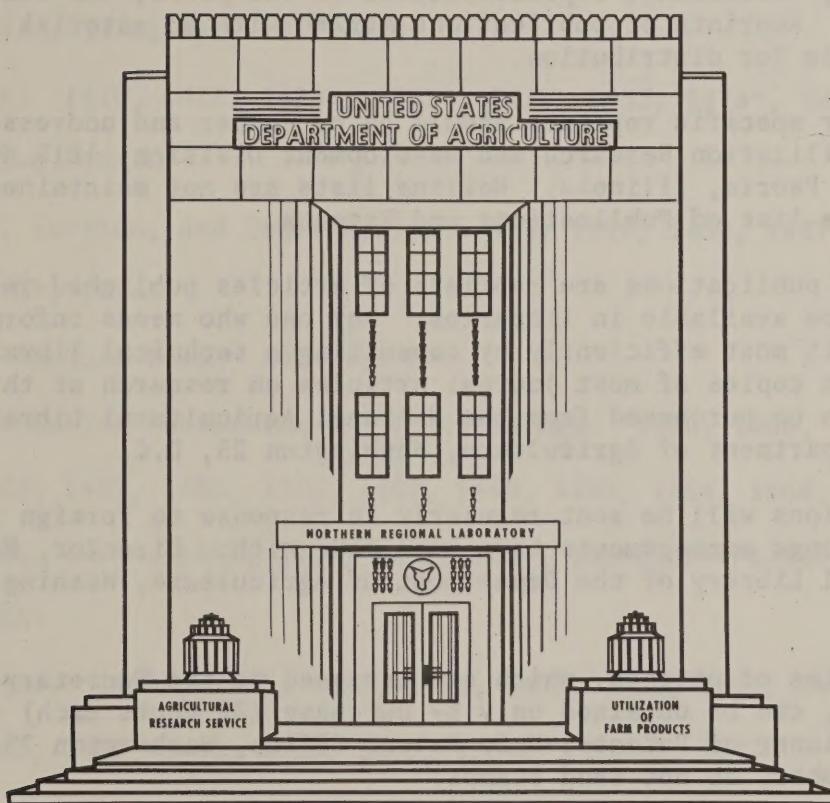


January 25, 1963

PUBLICATIONS AND PATENTS
of the
NORTHERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION
Peoria, Illinois, for the period
JULY - DECEMBER 1962



Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

1.

Congress in 1938 authorized four regional laboratories to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. Agricultural products assigned the Northern Division are: The cereal grains--corn, wheat, barley, grain sorghum, and oats; the oilseeds--soybean, flaxseed, safflower, and erucic acid-containing oilseeds; and new crops. The abstracts in this list describe current research on these commodities and indicate progress achieved by the Northern Division.

Northern Division publications are available, in conformance with the policy of the Department of Agriculture, to scientists and other specialists, librarians, representatives of the press, and others interested. Reprints of publications marked with an asterisk (*) are not available for distribution.

Requests for specific reprints should be by number and addressed to: Northern Utilization Research and Development Division, 1815 North University, Peoria, Illinois. Mailing lists are not maintained except for the list of Publications and Patents.

Most of the publications are reprints of articles published in journals that are available in libraries. Any one who needs information may obtain it most efficiently by consulting a technical library. Photographic copies of most journal articles on research at this Division can be purchased from the National Agricultural Library of the U.S. Department of Agriculture, Washington 25, D.C..

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with: Director, National Agricultural Library of the Department of Agriculture, Washington 25, D.C.

Printed copies of patents, which are assigned to the Secretary of Agriculture, can be obtained only by purchase (25 cents each) from the Commissioner of Patents, U.S. Patent Office, Washington 25, D.C. Order by number, do not send stamps.

Copies of previous lists of publications and patents are available on request.

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- 1232 * PROGRESS IN RESEARCH ON LINSEED OIL AT THE NORTHERN REGIONAL RESEARCH LABORATORY.

J. C. Cowan.

Proc. Can. Barley and Oil Seeds Conf., Winnipeg, Manitoba, February 24, 1958, and February 26, 1960, pp. 28-34 of the 1960 program. April 1960.

Investigations on linseed oil emulsion paints are reviewed. Cyclic fatty acids, after-yellowing of linseed oil, phospholipides of flax, and ozone-reductive cleavage of the oil are also discussed briefly.

- 1388 PROPOSAL TO DESIGNATE STRAIN ATCC 3004 (IMRU 3004) AS THE NEOTYPE STRAIN OF STREPTOMYCES ALBUS (ROSSI DORIA) WAKSMAN AND HENRICI.

Thomas G. Pridham and Allister J. Lyons, Jr.

Intern. Bull. Bacteriol. Nomenclature and Taxonomy 12(3): 123-126. July 15, 1962.

Strain ATCC 3004 (American Type Culture Collection; IMRU 3004, Institute of Microbiology, Rutgers University) is proposed as the neotype strain of Streptomyces albus (Rossi Doria) Waksman and Henrici 1943. S. albus is by original designation the type species of the genus Streptomyces Waksman and Henrici 1943.

- 1402 LINSEED OIL EMULSION PAINTS HAVING INCREASED STABILITY TO DRIERS AND PIGMENTS.

W. L. Kubie, J. A. Stolp, A. W. Schwab, H. M. Teeter, and J. C. Cowan. Offic. Dig. Federation Soc. Paint Technol. 34(450): 693-703. July 1962.

In the absence of pigments and driers, linseed oil-in-water emulsions stable over a pH range of 1-10 are readily prepared with 0.2-10% of a variety of anionic and nonionic surfactants. If conventional naphthenate driers are present, at least 5-10% of surfactant is needed for stable emulsions. If chelating agents, such as o-phenanthroline or ammonium dipicolinate, are used when naphthenates are present, only the minimum amount of surfactant is required. Since driers chelated with these agents are more active than unchelated driers but are more easily stabilized, less drier is also required. Use of 0.08% cobalt as naphthenate with 0.1% o-phenanthroline or ammonium dipicolinate seems as effective as 0.6% lead plus 0.06% cobalt. Special linseed emulsifiers also increase stability. Linseed oil emulsion paints containing zinc oxide have been formulated by these techniques and have been viscosity stable for over 1 year.

1404 * RESEARCH IMPLICATIONS AND PROBLEMS IN USING SOYBEAN PRODUCTS IN HUMAN FOODS.

F. R. Senti.

Soybean News 13(2): 5-6. January 1962. *

(Pub. National Soybean Crop Improvement Council, Urbana, Ill.)

The summary remarks given at a conference on soybean products for protein in human foods. The full proceedings of the conference are cited under 1466.

1405 NEW INDUSTRIAL CROPS--SOME ECONOMIC CONSIDERATIONS.

Warren K. Trotter,¹ Frederick J. Poats,² and Ivan A. Wolff.

(¹USDA Marketing Economics Div., Peoria, Ill.; ²USDA Marketing Economics Div., Washington, D.C.)

Agr. Econ. Rept. No. 10, U.S. Dept. Agr., 45 pp. June 1962.

Preliminary evaluations are made of the economic potentials of three types of new industrial crops: (1) Annual pulp crops, such as kenaf and crotalaria, to provide raw material for the pulp and paper industry; (2) new oilseed crops, such as Abyssinian kale, cape marigold, and Indian ironweed, that are sources of unique industrial oils or are high in erucic or petroselinic acids; and (3) guar--a summer legume and source of natural gum. Techniques for appraising the economics of prospective new crops are emphasized.

1406 PERIODATE-OXIDIZED PHOSPHOMANNAN Y-2448: STRUCTURAL SIGNIFICANCE OF ITS REACTION WITH ALKALI.

Allene Jeanes and P. R. Watson.

Can. J. Chem. 40(7): 1318-1325. July 1962.

The diesterorthophosphomannan produced by Hansenula holstii NRRL Y-2448 was shown by periodate oxidation analysis to have 20% of its D-mannose units linked through C₁ only (or C₁ and C₆), 33% through C₁ and C₂, and 47% through C₁ and C₃. The data do not indicate branching in this macromolecular polysaccharide derivative. Observations support the hypothesis that diesterorthophosphate groups (0.20 mole/mole mannose unit) are held between C₆ of the C₁-linked units and C₁ of 60% of the C₂-linked units. After periodate oxidation, both phosphoester bonds occupy β -aldehyde positions and can be eliminated as inorganic phosphate by dilute alkali. Also after periodate oxidation, units linked C₁ and C₂ to other mannose units provide additional alkali-reactive sites where β -dealkoxylation may occur.

1407 RECOVERY OF SOYBEAN WHEY PROTEIN WITH EDIBLE GUMS AND DETERGENTS.

Allan K. Smith, Arlo M. Nash, A. C. Eldridge, and W. J. Wolf.

J. Agr. Food Chem. 10(4): 302-304. July/August 1962.

Soybean whey, the filtrate obtained from acid-precipitated curd in isolating soybean protein from defatted meal, contains approximately one-third of the original soybean meal. Because of its high biological oxygen demand (BOD), it presents a serious waste

disposal problem. Whey proteins, which constitute about 12% of whey solids, can be precipitated in varying quantities, up to 100%, as insoluble complexes with negatively charged colloids, such as alginic acid, gum karaya, Irish moss extractives, and anionic detergents. The complexes with edible gums retain the enzymatic activity of the original proteins and the properties of the original gums. The detergent complexes have no enzymatic activity. Removing protein from whey lowers the BOD from 8 to 18%.

- 1408 CONDENSATION POLYMERS FROM 3,9-BIS(7-CARBOMETHOXYHEPTYL)-2,4,8,10-TETRAOXASPIRO[5.5]UNDECANE. I. POLY(ESTER-ACETALS) AND A NOVEL METHOD FOR CROSSLINKING THEM.

E. H. Pryde, R. A. Awl, H. M. Teeter, and J. C. Cowan.
J. Polymer Sci. 59(167): 1-11. May 1962.

3,9-Bis(7-carbomethoxyheptyl)-2,4,8,10-tetraoxaspiro[5.5]-undecane (the pentaerythritol acetal of methyl azelaaldehyde) in the presence of basic catalysts undergoes condensation polymerization with ethylene glycol to give linear polymers, either alone or in conjunction with other dibasic esters. These linear poly(ester-acetals) are susceptible to crosslinking by *p*-toluenesulfonic acid and by various metal oxides and salts, such as zinc oxide, zinc acetate, litharge, and magnesium oxide. The crosslinked polymers are insoluble, infusible, transparent solids that strongly adhere to glass.

- 1409 INTRINSIC VISCOSITY OF DIALDEHYDE STARCH IN ALKALINE UREA AFTER REDUCTION WITH BOROHYDRIDE.

W. C. Schaefer, Judith J. Maurice, C. R. Russell, and C. E. Rist.
Cereal Chem. 39(4): 304-310. July 1962.

Periodate-oxidized starch, commonly called dialdehyde starch (DAS), was reduced with borohydride at 1.5° C. to minimize alkaline degradation, and dispersed in an aqueous alkaline solvent system. The final solvent system consisted of 0.5N potassium hydroxide containing 25 grams of urea per 100 ml. solution. Absence of nitrogen from reduced DAS isolated from dispersion in this system indicated that the pretreatment left no aldehyde groups available for reaction with urea.

Intrinsic viscosities of reduced DAS dispersed in this system were significantly higher and were more stable than those obtained without prior reduction. Comparable values were obtained in both systems with less sensitive starch derivatives, but again, the reduction system gave improved stability.

- 1410 PREPARATION AND PROPERTIES OF SULFATED WHEAT FLOUR.

H. E. Smith, C. R. Russell, and C. E. Rist.
Cereal Chem. 39(4): 273-281. July 1962.

Ungelatinized sulfates of hard red winter wheat flour with sulfur contents ranging from 1.97-4.60%, calculated as weight percent -SO₃H, were prepared in 80-90% yields by treatment with trimethylamine-sulfur trioxide in an aqueous system catalyzed by sodium

hydroxide. The most distinctive characteristics of the sulfated wheat flours are their high degree of dispersibility, high viscosity, and exceptional clarity in aqueous systems. Preliminary evaluations of the sulfated wheat flour for a number of nonfood industrial applications indicate that its properties may be useful as flocculating agents, oil-well drilling mud additives, and as a surface size for paper.

- 1411 COMPOSITION OF THE COMPONENT PARTS OF TWO HYBRID HIGH-AMYLOSE CORNS.
R. A. Anderson, D. E. Uhl, W. L. Deatherage, and E. L. Griffin, Jr.
Cereal Chem. 39(4): 282-286. July 1962.

A chemical analysis of the component parts--endosperm, germ, and bran--of two potentially industrial high-amylose corn hybrids and of ordinary dent corn revealed several significant differences. Samples of 57 and 67% amylose corns had more protein and oil and less starch than ordinary corn. The quantity of endosperm from the high-amylose corns was less than from ordinary corn, and their protein and fat contents were greater while their starch contents were considerably less. No outstanding differences were noted in the composition of the germ fractions. More bran was obtained from the two high-amylose corns, and their protein and fat contents were somewhat greater than noted in ordinary corn bran.

- 1412 ELECTROPHORETIC COMPOSITION OF GLUTENS FROM AIR-CLASSIFIED FLOURS.
R. W. Jones and R. J. Dimler.
Cereal Chem. 39(4): 336-340. July 1962.

Gluten was separated from the flour and from the high- and low-protein fractions of a hard red winter, a soft red winter, and a club wheat. These glutes were compared by both starch gel and moving boundary electrophoresis. Glutes from a given wheat flour and from its high- and low-protein fractions were electrophoretically identical and exhibited the same components in the same relative concentrations.

- 1413 THALICTRUM POLYCARPUM FATTY ACIDS--A NEW CLASS OF FATTY ACIDS FROM VEGETABLE SEED OILS.
M. O. Bagby, C. R. Smith, Jr., K. L. Mikolajczak, and I. A. Wolff.
Biochemistry 1(4): 632-639. July 1962.

The principal fatty acid of *Thalictrum polycarpum* seed oil is the previously unknown trans-5, cis-9, cis-12-octadecatrienoic acid (35%). The oil also contains cis-9-octadecenoic (oleic) acid; trans-5-octadecenoic acid, not previously demonstrated in plant material; and two major components not characterized, a C₁₈-dienoic acid (18%) and an unknown C₁₈-acid (8%).

- 1415 LABELING FATTY ACIDS BY EXPOSURE TO TRITIUM GAS. III. METHYL STEAROLATE AND METHYL LINOLENATE.
H. J. Dutton, E. P. Jones, V. L. Davison,¹ and R. F. Nystrom.¹
(¹Radiocarbon Laboratory, University of Illinois, Urbana.)
J. Org. Chem. 27(7): 2648-2649. July 1962.

Methyl linolenate adds gaseous tritium to give isomeric octa-decadienoates. Methyl stearolate yields cis and trans 9,10-tritiooctadecenoates as major radiochemical products.

1416 * OIL USES AND THEIR POTENTIAL.

L. L. McKinney.

Proc. Pacific Northwest Oilseed Crop Conf., Oregon State University, Corvallis, pp. 73-100. May 15-16, 1962.

For domestic oilseed production to be increased more rapidly than population growth, more liquid oils must find export markets. Extensive research is being conducted to develop a more stable soybean oil. Studies are also being made to improve drying oils for increased use in protective coatings and on chemical conversion of vegetable oils to new resins, plastics, and plasticizers. New oilseed crops are being sought to give oils with special properties to replace imported oils. Also, unique oils would serve as raw materials in the organic chemicals industry.

1417 FATTY ACIDS, FATTY ALCOHOLS, AND WAX ESTERS FROM LIMNANTHES DOUGLASSII (MEADOWFOAM) SEED OIL.

T. K. Miwa and I. A. Wolff.

J. Am. Oil Chemists' Soc. 39(7): 320-322. July 1962.

Derivatives were prepared from Limnanthes douglasii seed oil, their physical and chemical properties were determined, and their similarity to jojoba oil is discussed.

1418 SOYBEAN UNSAPONIFIABLES: CHROMATOGRAPHIC SEPARATIONS AND CHARACTERIZATION.

R. L. Hoffmann, H. A. Moser, C. D. Evans, and J. C. Cowan.

J. Am. Oil Chemists' Soc. 39(7): 323-327. July 1962.

Unsaponifiabiles extracted from 10 different lots of refined soybean oil were subjected to liquid-liquid chromatographic separations. Three major fractions were obtained. The least polar hydrocarbon fraction constituted 15-30% of the unsaponifiabiles; the most highly polar fraction contained the steroids constituting 35-45% of the unsaponifiabiles. The fraction of intermediate polarity varied in composition from lot to lot, but usually it contained more than 50% of the unsaponifiabiles. These basic fractions were analyzed by thin-layer, gas-liquid chromatography and by chemical tests for functional groups.

To determine the effects of soybean unsaponifiabiles on the oxidative and organoleptic stability of edible fats, various concentrations of the extracted and fractionated materials were examined in cottonseed oil. Effects of extraction methods on yields, fractionation characteristics, and composition of the different lots of soybean unsaponifiabiles are discussed.

973 VOLATILITY OF ALCOHOL MOTOR FUELS.

Richard Wiebe, C. B. Kretschmer, and A. P. McCloud.

Philippine J. Sci. 90(2): 223-238. June 1961.

This paper and the following one report studies completed in 1955. The information is expected to be of interest in areas in which alcohol may be available economically.

1419 HIGH-COMPRESSION TRACTOR ENGINES WITH ALCOHOL-GASOLINE BLENDS.

M. M. Gilbert, W. B. Roth, and Richard Wiebe.

Philippine J. Sci. 90(2): 239-248. June 1961.

This paper and the preceding one report studies completed in 1955. The information is expected to be of interest in areas in which alcohol may be available economically.

1421 CEREAL PULPS. I. PREPARATION AND APPLICATION OF CROSS-LINKED CEREAL XANTHATES IN PAPER PRODUCTS.

C. R. Russell, R. A. Buchanan, C. E. Rist, B. T. Hofreiter, and A. J. Ernst. Tappi 45(7): 557-566. July 1962.

Cereal starches and cereal grain flours have been chemically converted in laboratory studies into water-soluble, cereal xanthate derivatives. Procedures have been developed for wet-end addition and for subsequent chemical precipitation of insoluble cereal xanthides and of polyvalent metal-xanthate salts on chemical or groundwood pulps. When used in papermaking, the products derived from cereal xanthates have been termed "cereal pulps" for brevity. The xanthides also showed utility as coating adhesives.

Starch, flours, and related materials have been converted by known procedures to xanthates having different degrees of substitution, but usually in the range 0.05-1.0. After addition of a solution of cereal xanthate to a pulp furnish, the xanthates are precipitated on the wood pulp as the insoluble xanthide by means of one of several low-cost oxidizing agents. Chlorine, iodine, nitrogen tetroxide, and nitrous acid have been used successfully.

1422 MUSTARD SEED PROCESSING: BLAND PROTEIN MEAL, BLAND OIL, AND ALLYL ISOTHIOCYANATE AS A BY-PRODUCT.

G. C. Mustakas, L. D. Kirk, and E. L. Griffin, Jr.

J. Am. Oil Chemists' Soc. 39(8): 372-377. August 1962.

Mustard seed like rapeseed is characterized by the presence of glucosides, which are readily hydrolyzed under certain conditions by enzymes in the seeds to produce pungent "mustard oils." This property is utilized in making condiments from some varieties of mustard, but when the seed is processed to yield a palatable oil feed meal, this pungent factor must be removed. In bench-scale studies odor was eliminated by converting the mustard glucoside enzymatically and removing the converted product, allyl isothiocyanate, during a subsequent cooking step before filtration-extraction of the meal. Little or no difficulty should occur in applying the filtration-extraction process commercially to mustard seed.

- 1423 TETRACYANOETHYLENE ADDUCT OF TRANS,TRANS-9,11-OCTADECADIENOIC ACID.
W. R. Miller and J. C. Cowan.
J. Am. Oil Chemists' Soc. 39(8): 380. August 1962.

The reaction of the dienophile with this acid is quite facile. The infrared spectrum of the resulting adduct is consistent with the Diels-Alder structure; absorption bands show the presence of a carbocyclic ring, cis-carbon-carbon unsaturation, and nitrile and carboxylic acid groups.

- 1424 * FINE GRINDING AND AIR CLASSIFICATION OF WHEAT FLOUR.
R. J. Dimler and V. F. Pfeifer.
Proc. 1961 Wheat Util. Conf., sponsored by Washington Association of Wheat Growers in cooperation with Washington Agricultural Experiment Stations, Spokane, pp. 39-46.
October 30-31, 1961.

The technique of fine grinding and air classification, which is described, was applied to representative classes of different wheats from the Pacific Northwest. The wheats differed widely in the extent to which they could be separated into high- and low-protein fractions. The performance of any wheat in this type of milling might become a quality factor superimposed on baking quality of wheat protein.

- 1425 * NEW DEVELOPMENTS IN THE CHEMISTRY OF WHEAT GLUTEN.
R. J. Dimler.
Proc. 1961 Wheat Util. Conf., sponsored by Washington Association of Wheat Growers in cooperation with Washington Agricultural Experiment Stations, Spokane, pp. 53-60.
October 30-31, 1961.

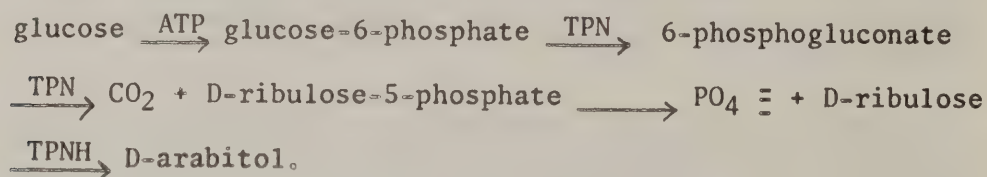
A progress report about research on wheat gluten proteins. New approaches are described in the search to find out exactly the composition of gluten, to identify quantitatively the different proteins and their fractions, and to determine precise molecular weights. All these factors must also be related to their effects in various wheat varieties.

- 1427 FORMATION OF EXTRACELLULAR SPHINGOLIPIDES BY MICROORGANISMS. III. TRIACETYL DIHYDROSPHINGOSINE, A METABOLIC PRODUCT OF THE YEAST HANSENULA CIFERRII.
Frank H. Stodola, Lynferd J. Wickerham, Charles R. Scholfield, and Herbert J. Dutton.
Arch. Biochem. Biophys. 98(1): 176. July 1962.

Triacetyl dihydrosphingosine has been shown to occur as a minor constituent in the mixture of extracellular lipids produced by the yeast Hansenula ciferrii, the main component of which is the already reported tetraacetylphytosphingosine. This is the first mention of the formation of a dihydrosphingosine derivative by a microorganism.

- 1428 MODE OF FORMATION OF D-ARABITOL BY SACCHAROMYCES MELLIS.
Ralph Weimberg (with the technical assistance of William L. Orton).
Biochem. Biophys. Res. Commun. 8(6): 442-445. August 1962.

A TPN-linked arabitol dehydrogenase is present in extracts of Saccharomyces mellis that catalyzes the oxidation of D-arabitol to D-ribulose. The equilibrium of the reaction is strongly in the direction of D-arabitol formation. Other sugar alcohols are oxidized by the crude extract, but from a study of the conditions for activity, apparently D-arabitol is oxidized by a specific enzyme. A suggested pathway for D-arabitol formation from glucose is:



The requisite enzymes have all been detected in crude extracts.

- 1429 GLUTEN AND STARCH FROM WHEAT FLOUR. AN IMPROVED PROCESS.
R. A. Anderson and E. L. Griffin, Jr.
Die Stärke 14(6): 210-212. June 1962.

An improved process to separate gluten and starch is applicable to different types of wheat flour. The process offers a rich source of gluten, which can be used in upgrading flour of poor baking quality. The protein content of the flours tested ranged from 9.2% for a soft wheat flour to 17.3% for a hard wheat low-grade flour. The range of ash content was 0.34-1.47%. Protein content of gluten recovered from these flours varied from 75-85%. The crude starch slurry recovered from this separation contained about 3% protein. Suggestions are given for possible uses of the product recovered by the process.

- 1430 DIALDEHYDE STARCH-CASEIN PAPER COATING ADHESIVES FOR IMPROVED WET-RUB RESISTANCE.
A. J. Ernst, M. E. Carr, F. B. Weakley, B. T. Hofreiter, and C. L. Mehltretter.
Tappi 45(8): 646-650. August 1962.

Recent work describes the irreversible insolubilization of casein from solution by dialdehyde starch (DAS). This reaction to impart a high degree of water insolubility to casein-based paper coating adhesives has now been applied. Data given show dependence of wet-rub resistance on coating mixture pH, ratio of DAS to casein, and time and temperature of drying. Excellent wet-rub resistance was obtained when as little as 1/8 part of DAS was used with 12 parts of casein per 100 parts of clay and when the coating mixture was at 50% solids. Viscosities of coating mixtures treated with DAS increased with time, and the increase was greatly accelerated at higher pH values. However, workable viscosities were obtained at

pH values of 6.7 and below. DAS can be used with coating mixtures that have a high pH if the DAS is added to the coatings immediately before application or if DAS is sprayed on a wet-coated sheet before drying. Wet-rub resistance was determined both semiquantitatively by a finger wet-rub method and quantitatively with an Adams wet-rub tester.

- 1432 AIR CLASSIFICATION MILLING RESULTS FOR WHEAT AND OTHER CEREAL FLOURS.
A. C. Stringfellow, V. F. Pfeifer, and E. L. Griffin, Jr.
Baker's Dig. 36(4): 38-40, 42, 76. August 1962.

As-milled and finely ground flours from representative U. S. varieties of wheat have been separated into fractions of progressively increasing particle size by repeated air classification. Concho variety HRW wheat yielded the highest protein fraction (35%); Brevor variety SWW flour from the Pacific Northwest, the lowest (1.3%). Low-protein fractions were subjected to further fine grinding and air classification to remove more protein material from the starch granules. This reprocessing produced a 1%-protein fraction from Brevor SWW at a yield of 37% of the original flour. Fractions containing less than 3% protein were produced from nearly all soft wheat flours.

Hard red winter wheats showed large variations in response to air classification of their flours. Variations resulted from using different varieties, or using the same variety from different areas, or having seasonal differences in growing conditions for one area. High-protein fractions from different varieties ranged from 20-35% protein, and low-protein fractions from 4-10%.

Low-protein fractions for industrial uses, 3% protein or less, are separated most readily from soft wheat flours. Most hard wheat flours do not readily yield fractions with a protein content that low since the values are usually in the 5-8% range. Fractions containing 20% protein or higher are obtainable from most soft wheat flours. Omar club was an exemption. All hard wheat flours tested yielded fractions containing 20% protein.

- 1433 EVIDENCE FOR A FUNCTIONAL DISULPHIDE IN PHOTOPHOSPHORYLATION.
J. W. Newton.
Nature 195(4839): 349-350. July 28, 1962.

Studies on the inhibition of photosynthetic phosphorylation by disulfide exchange reactions have provided evidence that disulfide bonds, which were previously shown to be important in maintenance of the intact structure of the photochemical apparatus of bacteria, are involved in a functional manner in the photophosphorylation process. The implications of these findings for processes of energy coupling in biological systems are discussed.

- 1434 CRAMBE. A POTENTIAL NEW CROP FOR INDUSTRIAL AND FEED USES.
Crops Res. Div. and North. Util. Res. Devlpmt. Div., Agr.
Res. Serv., U. S. Dept. Agr. ARS-34-42. September 1962.
9 pp.

Cooperative research is underway to discover and develop new crops for the American farmer. One of the most promising is crambe, currently being investigated as a source of erucic acid in the seed oil. The various chemical and agronomic aspects are given, as well as utilization prospects and research objectives.

- 1435 AMINO ACID COMPOSITION OF SEED MEALS FROM FORTY-ONE SPECIES OF CRUCIFERAE.

Roger Wayne Miller, C. H. VanEtten, Clara McGrew, I. A. Wolff, and Quentin Jones.¹ (¹USDA Crops Research Div., Beltsville, Md.)
J. Agr. Food Chem. 10(5): 426-430. September/October 1962.

Seed meals of 41 species from 29 genera of Cruciferae were analyzed for 18 amino acids. Crude protein content ranged from 14-61%; lysine, from 167-466 milligrams per gram of nitrogen; and methionine, from 62-120 milligrams. Eight seed meals with 34-47% crude protein contained high lysine (above 341 milligrams) and high methionine (above 95 milligrams). Hydroxyproline occurred in all meals examined. By Mitchell's chemical method of evaluating nutritive quality, 31 meals rated scores of 70 or more. By the FAO method, only 17 scored over 70.

- 1436 RECOVERY OF MICROBIAL POLYSACCHARIDE B-1459 WITH A QUATERNARY AMMONIUM COMPOUND.

W. J. Albrecht, S. P. Rogovin, and E. L. Griffin, Jr.
Nature 194(4835): 1279. June 30, 1962.

The bacterium Xanthomonas campestris NRRL B-1459 synthesizes an exocellular polysaccharide by fermentation of a glucose-containing medium. The fermented broth has a viscosity of ca. 7,000 cp. and contains 1.5% polymer. The usual method for isolating the polymer from the broth is accomplished by the addition of a water-miscible solvent in the presence of an electrolyte. Because high viscosity prevents polymer concentration above 1.5% in the broth, large amounts of solvent are required. A cyclic process to isolate the polysaccharide with a quaternary ammonium compound (QAC) and to recover and reuse the QAC has been developed.

- 1437 CAROTENOIDS OF CORN AND SORGHUM. II. CAROTENOID LOSS IN YELLOW-ENDOSPERM SORGHUM GRAIN DURING WEATHERING.

C. W. Blessin, R. J. Dimler, and O. J. Webster.¹ (¹USDA Crops Research Div., Lincoln, Neb.)
Cereal Chem. 39(5): 389-392. September 1962.

When exposed to weathering after pollination, sorghum retained only 50% of the carotenoids present in protected seed heads. Carotenes and xanthophylls decreased, with no preferential loss of

individual carotenoids. The presence of red pigments in the pericarp did not inhibit loss of carotenoids. The adverse effect of weathering on yellow-endosperm sorghum grain is a major problem in the program for breeding high-carotenoid sorghums.

- 1438 CORN DRY-MILLING: INFLUENCE OF FEED RATE AND TAIL-GATE LOADING UPON BEALL DEGERMINATOR PERFORMANCE.

O. L. Brekke, L. A. Weinecke, and E. L. Griffin, Jr.

Cereal Chem. 39(5): 381-388. September 1962.

Feed rate has a pronounced effect and tail-gate loading a lesser effect on degerminator performance. As the feed rate was increased from 8 to 18 bushels per hour, using a moderate tail-gate loading on a No. 0 degerminator (rated 10 to 20 bushels per hour), germ and oil recovery decreased considerably; oil content of the coarser grits increased over twofold; and yield of hominy grits (-4+6 mesh) rose steadily while the yield of -6+8 grits and hull reached a maximum and -4+6 grits with attached hulls a minimum at 11-12 bushels per hour.

With a heavy tail-gate loading the hourly throughput decreased 20%. A smaller yield of -4+6 grits and larger yields of -6+8 grits, germ, and hull were obtained along with better dehulling or polish and with grits of lower fat content.

Improved germ and oil recovery and grits of lower oil content are obtained by operating Beall degerminators at much less than usual throughput rates (about 0.8 of listed minimum rate or 0.3 of present commercial rate) and a minimum to moderate tail-gate loading.

- 1439 A NOTE ON THE WET-MILLING OF HIGH-AMYLOSE CORN CONTAINING 75-PERCENT-AMYLOSE STARCH.

R. A. Anderson.

Cereal Chem. 39(5): 406-408. September 1962.

Wet-milling characteristics of a 75%-high-amylose corn hybrid are similar to those previously reported for the semicommercial 57%-amylose corn hybrid. The recovery of starch was 71.6%, and it contained 0.59% protein.

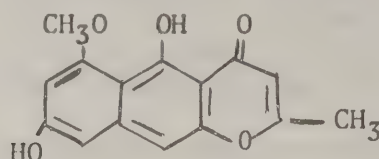
- 1440 FONSECIN, A NAPHTHOPYRONE PIGMENT FROM A MUTANT OF ASPERGILLUS FONSECAEUS.

Oscar L. Galmarini, Frank H. Stodola, Kenneth B. Raper, and Dorothy I. Fennell.

Nature 195(4840): 502-503. August 4, 1962.

Fonsecin ($C_{15}H_{12}O_5 \cdot H_2O$, m.p. 198° decomposition) is a crystalline yellow pigment produced by the 016-1 mutant of Aspergillus fonsecaeus (type strain NRRL 67), and it can be obtained in pure form with a yield of 4.5% of the weight of the dry mycelium.

By demethylation, fonsecin gives nor-rubrofusarin; by complete methylation, rubrofusarin dimethyl ether is formed. During oxidation of fonsecin monomethyl ether with potassium permanganate, 3,5-dimethoxyphthalic acid is formed. According to these main reactions, the following structure is proposed for this new, naturally occurring, 2-methyl naphthopyrone:



1441 POLYUNSATURATES: DOMESTIC SUPPLIES AND PRODUCTS.

J. C. Cowan.

J. Am. Oil Chemists' Soc. 39(9): 4, 5, 14-15. September 1962.

Sources of edible oils high in polyunsaturated fatty acids are reviewed, as are the availability and composition of these oils and the products derived from them.

1442 SEARCH FOR NEW INDUSTRIAL OILS. VII.

F. R. Earle, I. A. Wolff, C. A. Glass, and Quentin Jones.¹

(¹USDA Crops Research Div., Beltsville, Md.)

J. Am. Oil Chemists' Soc. 39(9): 381-383. September 1962.

Seed oils of 37 plant species from 18 families were analyzed for fatty acid composition by isomerization. The variability encountered is evidenced by the range in content of component acids: from 0-23% for apparent linolenic acid, from 8-74% for apparent linoleic acid, and from 2-88% for apparent oleic acid. Approximately 60% of dimorphecolic acid occurs in a second species of Dimorphotheca, D. pluvialis (L.) Moench, and in the closely related species, Osteospermum ecklonis (DC.) T. Norl. O. spinescens Thunb. contained instead 30% of a conjugated triene, presumably the same as the 8,10,12-octadecatrienoic reported from the related Calendula officinalis L. Oils rich in monoenoic acids are mostly in the Umbelliferae and Araliaceae and, presumably, contain petroselinic acid as well as oleic.

1443 DENSIPOLIC ACID: A UNIQUE HYDROXYDIENOID ACID FROM LESQUERELLA DENSIPILA SEED OIL.

C. R. Smith, Jr., T. L. Wilson, R. B. Bates,¹ and C. R. Scholfield.

(¹Department of Chemistry and Chemical Engineering, University of Illinois, Urbana.)

J. Org. Chem. 27(9): 3112-3117. September 1962.

A new, hydroxy fatty acid found as a major constituent of Lesquerella densipila seed-oil glycerides, to be called densipolic acid, was shown to be 12-hydroxy-cis-9,cis-15-octadecadienoic acid. The structure was deduced chemically by oxidative degradations and corroborated by NMR spectra. An anomalous case of the von Rudloff permanganate-periodate oxidation was found in which β -hydroxyadipic acid expected as one of the end products instead underwent oxidative decomposition.

1444 UPGRADING INSULATING BOARD AND MOLDED PULP PRODUCTS BY MINOR ADDITIONS OF DIALDEHYDE STARCH.

T. R. Naffziger, B. T. Hofreiter, and C. E. Rist.
Tappi 45(9): 745-750. September 1962.

Dialdehyde starch (DAS) has been studied as an additive to upgrade both the furnishes and final strength properties of insulating boards and molded pulp products. Experimental boards and handsheets were prepared in a range of furnishes containing sugarcane bagasse pulp, used newsprint, and 2.5% (O.D. pulp basis) DAS. Retention of as little as 0.5% DAS (O.D. pulp basis) in boards made only from fast-draining bagasse greatly improved dry- and wet-strength properties. With 75% bagasse and 25% newsprint dry modulus of rupture improved 64% and dry tensile strength 130%. Wet-strength increases for this same pulp blend were as high as 900% of that of untreated boards. Consequently, DAS may be used in board furnishes to reduce substantially the requirement for newsprint. DAS also provides improved pulp drainage and lower board densities, properties desired by manufacturers of insulating board. Improvement in dry- and wet-strength properties of boards from high newsprint furnishes makes DAS of interest in the manufacture of molded pulp products.

1445 PREPARATION OF CATIONIC DIALDEHYDE STARCHES FOR WET-STRENGTH PAPER.

C. L. Mehlretter, T. E. Yeates, G. E. Hamerstrand, B. T. Hofreiter, and C. E. Rist.
Tappi 45(9): 750-752. September 1962.

Dialdehyde starches (DAS) containing cationic substituents have been prepared in high yield by relatively simple procedures. Periodate oxidation of two commercial cationic starch ethers gave the corresponding positively charged DAS. Reaction of a small proportion of the carbonyl groups in DAS with hydrazides containing tertiary and quaternary nitrogen groups produced cationic partial hydrazones. Both products are readily dispersed in water. Preliminary evaluations show that cationic DAS has promise as a one-step wet-end additive to make high wet-strength paper.

1446 SELECTIVE HYDROGENATION OF METHYL OLEATE OZONOLYSIS PRODUCTS BY PALLADIUM IN PYRIDINE-METHANOL SOLVENT.

E. H. Pryde, D. E. Anders, H. M. Teeter, and J. C. Cowan.
J. Org. Chem. 27(9): 3055-3059. September 1962.

Decomposition of the ozonolysis products formed by ozonization of methyl oleate in methanol gave dimethyl azelate as a major by-product when reductive decomposition to aldehydes was carried out by hydrogenation over palladium on charcoal. The presence of pyridine during hydrogenation resulted in significantly reducing the amounts of dimethyl azelate and other byproducts formed and poisoned the catalyst for hydrogenation of olefinic unsaturation.

Thus, yield and purity of aldehyde ester were improved and unused methyl oleate could be recovered. Hydrogenation was under ambient conditions. Reaction mechanisms are suggested that explain the contrasting results obtained with certain nonreactive solvents.

1447 CHEMICAL ENGINEERING IN FERMENTATIVE PROCESSING.

Virgil E. Sohns.

North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U. S. Dept. Agr.
ARS-71-21. October 1962. 20 pp.

Outlined are chemical engineering investigations at the Northern Division that relate to the development of fermentation processing of agricultural materials. These fermentation studies include processes to make vitamins and food supplements, organic acids and salts, microbial polymers, and fungal enzymes.

1448 SOYBEAN TRYPSIN INHIBITORS: ISOLATION, PURIFICATION, AND PHYSICAL PROPERTIES.

J. J. Rackis, H. A. Sasame, R. K. Mann, R. L. Anderson, and A. K. Smith.

Arch. Biochem. Biophys., 98(3): 471-478. September 1962.

Two highly purified trypsin inhibitors, designated SBTIA₁ and SBTIA₂, have been isolated directly from soybean whey solutions by chromatography on DEAE-cellulose. The two inhibitors differ in physical properties, nitrogen content, and trypsin-inhibitor activity. SBTIA₂ is identical to Kunitz' crystalline soybean trypsin inhibitor. Molecular weight determinations and activity measurements indicate that SBTIA₁ and A₂ form trypsin-trypsin inhibitor complexes in the ratio of 1:1. Commercial preparations of 5X crystallized soybean trypsin inhibitor frequently contain 5-50% impurities. A chromatographic method was developed on a preparative scale to purify these commercial inhibitors.

1449 FORMATION OF EXTRACELLULAR SPHINGOLIPIDS BY MICROORGANISMS. IV. PILOT-PLANT PRODUCTION OF TETRAACETYLPHYTOSPHINGOSINE BY HANSENULA CIFERRII.

Hanns G. Maister, S. Peter Rogovin, Frank H. Stodola, and Lynferd J. Wickerham.

Appl. Microbiol. 10(5): 401-406. September 1962.

Tetraacetylphytosphingosine (TAPS) formation by the F-60-10 mating type strain of the yeast Hansenula ciferrii, previously observed on agar plates, takes place in submerged cultures. The optimal conditions for TAPS formation, and the correlation of TAPS production and sugar utilization under aerobic conditions, were studied in 10-liter fermentors. For each gram of glucose consumed, 5 mg. of TAPS were formed; for each gram of yeast solids produced, 15 mg. of TAPS were synthesized. A 750-liter pilot-plant run yielded 175 grams of crude TAPS, which were obtained by hexane extraction of centrifuged yeast cells.

1450 NITROGENOUS DERIVATIVES OF CYCLIC FATTY ACIDS.

W. J. DeJarlais and H. M. Teeter.

J. Am. Oil Chemists' Soc. 39(10): 421-424. October 1962.

A number of nitrogenous derivatives of cyclized acids derived from C-18, triene-containing fatty acid sources were prepared. Mixed amides (m.p. 33° C.), nitriles (f.p. -25° C.), and amines (f.p. -34° C.), prepared from the hydrogenated cyclic acids, have uniquely low melting points for fat-derived substances of their molecular size. Compatibility with synthetic resins and solubility in organic solvents of the mixed amides are high compared to common fatty-amide mixtures. The nitriles and morpholides are compatible with polyvinyl chloride and may have potential as plasticizers for it. The amines provide liquid C-18 fatty amines. The diethanol amides, ethenoxylated amides, and quaternary amines were prepared and their surface-active properties compared with similar fat-derived substances.

1451 REACTION OF ETHYLENE WITH C₁₈ MONOCARBOXYLIC DIENOIC ACIDS.

J. P. Friedrich, E. W. Bell, and R. E. Beal.

J. Am. Oil Chemists' Soc. 39(9): 420. September 1962.

Ethylene, the simplest dienophile, reacts with various diene systems to give cyclic adducts in moderate yields. We discovered that ethylene will react almost quantitatively with 9,11-t,t-octadecadienoic acid to yield a new C₂₀ monocarboxylic acid. Its iodine value indicates the presence of one double bond, and the infrared absorption at 673 cm⁻¹ is characteristic of cyclohexenes.

1452 BRIDGING UTILIZATION ENGINEERING DEVELOPMENT TO INDUSTRIAL USAGE.

Dwight L. Miller and Edward L. Griffin, Jr.

North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr. ARS-71-20. October 1962. 24 pp.

Techniques and procedures used in bringing developments resulting from utilization research into industrial usage are distinct from practices normally followed by industrial companies. Methods used are outlined and illustrated by a technical example of an actual starch product from its basic development to commercialization.

1453 EXOCELLULAR BACTERIAL POLYSACCHARIDE FROM XANTHOMONAS CAMPESTRIS NRRL B-1459. PART I. CONSTITUTION.

J. H. Sloneker and Allene Jeanes.

Can. J. Chem. 40(11): 2066-2071. November 1962.

Polysaccharide B-1459, the first bacterial polysaccharide reported to contain pyruvic acid as a constituent, is composed of D-glucose, D-mannose, D-glucuronic acid, acetic acid, and pyruvic acid in the ratio of 2.8:3.0:2.0:1.7:0.51--0.63 and has a repeat unit weight of 1580. The molecule, which forms highly viscous solutions, appears to be linear with a single side-chain mannose unit per repeat unit. Three acidic oligosaccharides were isolated from acid hydrolysates by paper chromatography: an aldobiuronic acid, 2-O-(β-D-glucopyranosyluronic acid)-D-mannose; an aldotriuronic acid composed of glucuronic acid linked 1-2 to

mannose and glucose as a reducing end group; and what appears to be an aldotetrauronic acid composed of glucuronic acid linked 1-2 to mannose and 2 moles of glucose.

- 1454 EXOCELLULAR BACTERIAL POLYSACCHARIDE FROM XANTHOMONAS CAMPESTRIS NRRL B-1459. PART II. LINKAGE OF THE PYRUVIC ACID.

J. H. Sloneker and Danute G. Orentas.

Can. J. Chem. 40(11): 2188-2189. November 1962.

Pyruvic acid was isolated from periodate-oxidized, borohydride-reduced polysaccharide B-1459 as a 1,3-O-(1-carboxyethylidene) derivative of erythritol, indicating that pyruvic acid is bound originally to glucose in the native polysaccharide by a 4,6-O-(1-carboxyethylidene) group.

- 1455 A SEARCH FOR NEW FIBER CROPS. V. PULPING STUDIES ON KENAF.
T. F. Clark, G. H. Nelson, H. J. Nieschlag, and I. A. Wolff.
Tappi 45(10): 780-786. October 1962.

Dry mature kenaf grown in Illinois was pulped by kraft, neutral sulfite, and soda processes, each at 15, 18, and 21% levels of total chemical (basis dry matter), to determine their relative merits and effectiveness in unbleached and bleached pulps. All digestions were for 2 hours at 170° C. Bleaching was a three-stage treatment. Bleached pulps beaten to a freeness of 600 ml. (S.-R.) were made into paper on a 10-in. fourdrinier machine. The neutral sulfite process gave highest yields of pulps and consumed the least pulping chemicals; the other two processes were approximately equivalent. Irrespective of the process, levels of 18 and 21% pulping chemical enhanced strength development, and a level of 21% chemical favored economy in bleaching. Strength characteristics of kenaf pulps were superior at the same freeness levels to those of commercial hardwood pulps and, except for resistance to tear, were generally comparable with softwood pulps.

- 1456 A SEARCH FOR NEW FIBER CROPS. VI. KENAF AND WOOD PULP BLENDS.
T. F. Clark and I. A. Wolff.
Tappi 45(10): 786-789. October 1962.

Selected blends of kenaf (Hibiscus cannabinus) and commercial wood pulps were made and evaluated as handsheets to appraise the advantages of such blending. Synergistic behavior was displayed for resistance to tear in many blending series. Folding endurance was much greater than anticipated when the kenaf pulps were blended with softwood kraft pulp. In most series, folding endurance and air permeability values of the blends were substantially less than linear relationships based on composition. The advantages gained from blending the kenaf pulps and wood pulps warrant more detailed study of selected blends for specific papers.

- 1457 COMPOSITION OF OILSEEDS. A LIST OF PUBLICATIONS, 1936-1961,
NORTHERN REGIONAL RESEARCH LABORATORY
North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr.
ARS-71-23, December 1962. 17 pp.

This bibliography represents 25 years of research work on the composition of oilseeds and related technology.

- 1458 PROCESSING OILSEEDS, OIL, AND MEAL. A LIST OF PUBLICATIONS AND PATENTS, 1936-1961, NORTHERN REGIONAL RESEARCH LABORATORY.
North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr.
ARS-71-24. December 1962. 11 pp.

This bibliography represents 25 years of research work on processing oilseeds, oil, and meal and on related technology.

- 1459 EDIBLE SOYBEAN OIL. A LIST OF PUBLICATIONS AND PATENTS, 1936-1961, NORTHERN REGIONAL RESEARCH LABORATORY.
North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr.
ARS-71-25. December 1962. 15 pp.

This bibliography represents 25 years of research work on edible soybean oil and related technology.

- 1460 EDIBLE SOYBEAN PROTEIN PRODUCTS. A LIST OF PUBLICATIONS AND PATENTS, 1936-1961, NORTHERN REGIONAL RESEARCH LABORATORY.
North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr.
ARS-71-26. December 1962. 9 pp.

This bibliography represents 25 years of research work on edible soybean protein products and related technology.

- 1461 CHEMICALLY MODIFIED OIL PRODUCTS AND INDUSTRIAL USES. A LIST OF PUBLICATIONS AND PATENTS, 1936-1961, NORTHERN REGIONAL RESEARCH LABORATORY.
North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr.
ARS-71-27. December 1962. 22 pp.

This bibliography represents 25 years of research work on chemically modified oil products, industrial uses, and related technology.

- 1462 INDUSTRIAL USES OF PROTEINS. A LIST OF PUBLICATIONS AND PATENTS, 1936-1961, NORTHERN REGIONAL RESEARCH LABORATORY.
North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr.
ARS-71-28. December 1962. 11 pp.

This bibliography represents 25 years of research work on industrial uses of soybean and corn proteins and on related technology.

- 1463 REVIEW ARTICLES ON OILSEED CROPS RESEARCH. A LIST OF PUBLICATIONS, 1936-1961, NORTHERN REGIONAL RESEARCH LABORATORY.
North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U.S. Dept. Agr.
ARS-71-29. December 1962. 9 pp.

This bibliography represents 25 years of research work reported in review articles on oilseed crops research, including oil, meal, and related subjects.

1464 A DISULFIDE PHOTOREDUCTION SYSTEM IN CHROMATOPHORES OF RHODOSPIRILLUM RUBRUM.

Jack W. Newton.

J. Biol. Chem. 237(10): 3282-3286. October 1962.

An enzymatic photochemical disulfide reducing reaction was observed with chromatophores derived from the photosynthetic bacterium Rhodospirillum rubrum. The reaction displayed an absolute dependence on light and required several dye mediators. The demonstration of this reaction helps to substantiate earlier postulates of the involvement of structural disulfides as active members of the photochemical electron transport system in photosynthesis.

1465 MISO FERMENTATION.

K. Shibasaki and C. W. Hesseltine.

Econ. Botany 16(3): 180-195. July/September 1962.

Miso is a fermented food widely consumed in the Orient and is prepared from mold rice, soybeans, and salt. About 13 million bushels of soybeans are made into miso each year, the annual production amounting to 974,000 metric tons.

1466 * SOYBEAN PRODUCTS FOR PROTEIN IN HUMAN FOODS.

Proc. Conf., sponsored by U.S. Department of Agriculture, United Nations Children's Fund, and Soybean Council of America, Peoria, Ill., September 13-15, 1961. North. Util. Res. Developmt. Div., Agr. Res. Serv., U.S. Dept. Agr. [ARS-71-22]. June 1962. 242 pp.

People in newly developing countries throughout the world need a low-cost, high-quality protein in their diet. Current research and needed technological assistance were outlined in adapting soybean products to the eating habits and customs of these people. Recent advances in nutritional research on soybean protein products and methods of processing to develop maximum nutritional values of these products for animals were reviewed, as well as progress in research on soybean protein products in human nutrition and in evaluating soybean protein emulsion and meal products as a baby food.

1467 * APPLIED MICROBIOLOGY IN ANIMAL NUTRITION.

Harlow H. Hall.

Advan. Appl. Microbiol. 4: 77-99. 1962.

Microorganisms, including bacteria, molds and yeasts, are a source of vitamins, antibiotics, proteins and amino acids, enzymes, and related factors used in animal rations to improve feed efficiency and to increase the rate of growth. Cereal grains, oilseed meals, and other agricultural products are the principal raw materials from which these feed supplements are derived by fermentation processes.

- 1468 HYDROLYSIS PRODUCTS OF PERIODATE-OXIDIZED PHOSPHOMANNAN Y-2448.
Allene Jeanes, J. E. Pittsley, P. R. Watson, and J. H. Sloneker.
Can J. Chem. 40(12): 2256-2259. December 1962.

Significant structural information, as well as saccharides not available previously, has been obtained through hydrolysis of periodate-oxidized phosphomannan Y-2448. Sequences of at least three α -1,3-linked mannose units occur in phosphomannan Y-2448, and the phosphate is present in the ortho form. A new saccharide, 3-O-[3-O-(α -D-mannopyranosyl)- α -D-mannopyranosyl]-D-mannose, has been obtained, and 3-O-(α -D-mannopyranosyl)-D-mannose has been isolated for the first time from a natural source.

- 1469 THE MICROBIOLOGICAL PRODUCTION OF 10-HYDROXYSTEARIC ACID FROM OLEIC ACID.
L. L. Wallen, R. G. Benedict, and R. W. Jackson.
Arch. Biochem. Biophys. 99(2): 249-253. November 1962.

A pseudomonad isolated from fatty material hydrates oleic acid at the unsaturated 9,10-position. 10-Hydroxystearic acid was produced in an overall yield of 14%. The structure of the compound was proved by gas chromatography, infrared analysis, and mass spectrometry and by conversion to 10-ketostearic acid, which was compared to a reference specimen obtained by synthesis. No other product of the microbial nondegradative modification of oleic acid was found in this survey.

- 1470 PURIFICATION AND STABILITY STUDIES OF THE 11S COMPONENT OF SOYBEAN PROTEINS.
W. J. Wolf, G. E. Babcock, and A. K. Smith.
Arch. Biochem. Biophys. 99(2): 265-274. November 1962.

The fraction of soybean proteins precipitating upon cooling an aqueous extract of soybean meal (cold-insoluble fraction) consists mainly of a component having a sedimentation constant of about 11S plus small amounts of 2, 7, and 15S components. Ammonium sulfate precipitation of the cold-insoluble fraction yields an 11S protein 91-93% pure by ultracentrifugation. Stability studies on the purified protein show that a distinct component of the soybean globulin fraction is isolated. The 11S protein is sensitive to freezing, freeze-drying, or storage as a moist curd precipitated by ammonium sulfate.

- 1471 ALDEHYDIC MATERIALS BY THE OZONIZATION OF VEGETABLE OILS.
E. H. Pryde and J. C. Cowan.
J. Am. Oil Chemists' Soc. 39(11): 496-500. November 1962.

Preparation of aldehydic compounds by reductive decomposition of ozonolysis products obtained from unsaturated vegetable oils or their derivatives is described. A reactive or participating solvent, such as methanol, is the most important reaction variable leading to good yields (90% or better when reduction with zinc in acetic acid is used). Hydrogenation of the ozonolysis products over palladium on charcoal results in as much as 25% byproduct ester formation. However, hydrogenation in the presence of pyridine

minimizes this byproduct formation and prevents saturation of unozonized double bonds in partial ozonization experiments. The preparation and potential uses of homologous C-9, C-11, C-12, C-13, and C-15 omega-formyl fatty acid esters and of aldehyde oils containing an average of 1.0-2.5 aldehyde groups per molecule are described. Polymers containing both acetal and ester (or amide) links in the polymer backbone can be prepared from the pentaerythritol acetal of methyl azelaaldehyde. These polymers have the unique property of crosslinking at high temperatures with certain catalysts to give resins strongly adherent to glass.

1472 COMPARATIVE TAXONOMY OF CRYSTALLOGENIC STRAINS OF PSEUDOMONAS AERUGINOSA AND PSEUDOMONAS CHLORORAPHIS.

William C. Haynes and Lenora J. Rhodes.

J. Bacteriol. 84(5): 1060-1084. November 1962.

Only 11 of 39 strains received in the ARS Culture Collection under the designation Pseudomonas chlororaphis were authentic; 28 were typical, pyocyanogenic strains of P. aeruginosa. Apparently this disproportionately high rate of misidentification arises from an erroneous belief that the ability to produce green and yellow crystals of chlororaphin and oxychlororaphin is confined to P. chlororaphis. The ability of many strains of P. aeruginosa to do likewise is not well known. Inasmuch as this characteristic is not unique to P. chlororaphis, other criteria are required to distinguish crystallogenic strains of these species. After a taxonomic comparison of 18 authentic strains of P. chlororaphis and 47 crystallogenic strains of P. aeruginosa, it was determined that there are 3 main distinctions: (1) P. aeruginosa grows well at 42° C. but fails to grow upon serial transfer at 5° C., whereas P. chlororaphis fails to grow at 42° C., but grows well at 5° C. (2) Most strains of P. aeruginosa produce pyocyanin, whereas P. chlororaphis strains do not. (3) P. aeruginosa cells possess only one or two polar flagella, whereas P. chlororaphis usually has at least four, sometimes as many as eight, polar flagella.

1473 * DETERMINATION OF PROTEIN. A SELECTED ANNOTATED BIBLIOGRAPHY.

F. R. Earle.

"Cost Reductions Through In-Plant Production Controls and Other Reports," Proc. 1962 Feed Production School, sponsored by Midwest Feed Manufacturers' Association, Kansas City, Missouri, pp. 105-107, November 12-14, 1962.

A list of 44 references compiled as a guide in evaluating methods used in feed mixing plants.

1474 PHYLOGENY AND BIOCHEMISTRY OF THE GENUS HANSENULA.

Lynferd J. Wickerham and Kermit A. Burton.

Bacteriol. Rev. 26(4): 382-397. December 1962.

Phylogeny of the genus is revealed by gradual changes in sexual, morphological, and biochemical characteristics, with habitat determining whether there will be weakening or strengthening of

biochemical and sexual reactions as each successive species is produced by the preceding species. Phylogenetic lines of species developing through relationships with coniferous and deciduous trees and, finally, to independence from trees show increase in the number of sugars fermented, the rate of fermentation, and the ability to produce esters, pellicles, or vitamins. Those lines becoming more dependent upon trees lose physiological capacities.

The most primitive species produce a new family of polymers related to the polysaccharides, called phosphomannans; the most recently evolved free-living species produce new sphingolipides.. A new sexual process called sexual agglutination was discovered in the genus Hansenula and has since been found in other genera of yeasts.

1475 LIQUID C-18 SATURATED MONOCARBOXYLIC ACIDS--THEIR PREPARATION, CHARACTERISTICS, AND POTENTIAL USES.

J. P. Friedrich and R. E. Beal.

J. Am. Oil Chemists' Soc. 39(12): 528-533. December 1962.

Liquid C-18 saturated monocarboxylic acids, which contain a ring structure and thus are termed "cyclic acids," have been prepared by the action of alkaline reagents on linseed oil, linolenic acid, and tung oil in ethylene glycol at elevated temperatures. The free fatty acids were subsequently isolated and distilled. Hydrogenation of the distillate, followed by separation of the straight chain components by low-temperature crystallization from acetone, gave these liquid acids. Under optimum conditions 41.4 grams of cyclic acids were obtained from 100 grams of linseed oil. Some hydroxy acids are formed during the cyclization; the extent depends upon reaction conditions. Cyclization carried out in the presence of ethylene gave increased yields of liquid acids. The addition of ethylene to a conjugated dienoic acid was demonstrated.

Evidence indicates that the bulk of the unhydrogenated cyclic acids are vicinal disubstituted cyclohexadienes. Gas chromatography of the cyclic acids hydrogenated to an iodine value ≤ 1 shows several components. This mixture of C-18 liquid acids has a pour point below -45° C. Preliminary evaluation of cyclic acids and their derivatives indicates possible applications in nonyellowing alkyds, low-temperature plasticizers, and lubricants.

1476 DIMER ACIDS.

J. C. Cowan.

J. Am. Oil Chemists' Soc. 39(12): 534-545. December 1962.

Included in the preparation and chemistry of dimer acids are modes of formation, structure, unique properties, and commercial manufacture. Derivatives and uses of dimer acids are also reviewed: free acids and their simple derivatives in corrosion inhibitors and lubricant additives; polyesters in rubber replacements, alkyd resins, and urethanes; and polyamide resins, both as thermoplastic

resins for heat-sealing and other adhesives, inks, and thixotropic gels, and as reactive resins for curing of epoxy resins and compounds for coatings and structural adhesives.

- 1477 RAPID PHOTOMETRIC DETERMINATION OF DIALDEHYDE STARCH IN PAPER.
D. J. Kay, G. E. Hamerstrand, and B. T. Hofreiter.
Tappi 45(12): 943-944. December 1962.

Dialdehyde starch (DAS), a new papermaking chemical, produces a high degree of wet strength when incorporated into paper as a wet-end additive. A rapid and reliable method of analysis for the content of DAS in paper was required for laboratory studies involving large quantities of handsheets. Also, such a method would be highly desirable in industrial applications for quality control. A rapid photometric method, employing a reflection densitometer to measure color intensity of the p-nitrophenylhydrazone of DAS formed in situ, has been developed.

Samples of paper containing DAS, 5 cm. in diameter, were treated with the hydrazine reagent and dried. The intensity of the reflected light was measured at 525 m μ . The logarithm of DAS content of the paper over the range 0.1-1% DAS is directly proportional to the reflection density (standard error of estimate $\pm$ 0.047%).

- 1478 * FLAVOR REVERSION AND RELATED FORMS OF OXIDATIVE DETERIORATION.
J. C. Cowan and C. D. Evans.
"Autoxidation and Antioxidants," ed. W. O. Lundberg, vol. II, chap. 14, pp. 593-628. New York. 1962.

A review of research on flavor reversion and other forms of oxidative deterioration that includes the definition and cause for reversion, how to measure reversion by taste panel procedures, oxidative cleavage products, effects of metals, and methods of reducing reversion of soybean oil.

CONTRACT RESEARCH PUBLICATIONS

[Report of research work done by an outside agency under contract with the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 102-C EFFECTS OF GIBBERELLINS AND CERTAIN SYNERGISTS ON ENZYME PRODUCTION DURING THE MALTING OF WHEAT.
James R. Fleming, John A. Johnson, and Byron S. Miller.
Kansas Agricultural Experiment Station, Manhattan.
J. Agr. Food Chem. 10(4): 304-308. July/August 1962.

103-C DIALDEHYDE STARCH AS A PRETANNING AGENT FOR VEGETABLE-TANNED SOLE LEATHER.

John F. Wagoner, Joseph C. Stemoroski, Wallace Windus (EU), and W. Clifford Witham (NU).

Armour Leather Company, Williamsport, Pennsylvania.

J. Am. Leather Chemists' Assoc. 57(7): 302-317. July 1962.

104-C GRAFT COPOLYMERS OF WHEAT STARCH.

Robert L. Walrath, Zoila Reyes, and C. R. Russell (NU).

Stanford Research Institute, Menlo Park, California.

Advan. Chem. Ser. No. 34: 87-95. 1962.

105-C * POLYALLOOCIMENE. II.

C. S. Marvel and P. E. Kiener.

University of Illinois, Urbana.

J. Polymer Sci. 61(172): 311-331. October 1962.

106-C AN ULTRACENTRIFUGAL METHOD FOR THE QUANTITATIVE DETERMINATION OF EMULSION STABILITY.

Robert D. Vold and Robert C. Groot.

University of Southern California, Los Angeles.

J. Phys. Chem. 66(10): 1969-1975. October 1962.

107-C REACTIONS BETWEEN ZINC CHLORIDE AND SURFACTANT SOLUTIONS.

Robert D. Vold and Hakam Singh.

University of Southern California, Los Angeles.

J. Am. Oil Chemists' Soc. 39(10): 424-430. October 1962.

[Report of research work supported with funds provided by the U.S. Department of Agriculture under the authority of U.S. Public Law 480, 83rd Congress, and sponsored by the Northern Utilization Research and Development Division.]

12-PL-480 AN APPROXIMATE ESTIMATION OF THE NUMBER AVERAGE DP OF AMYLOSE AND AMYLOPECTIN IN MODERATELY DEGRADED WHOLE (UNFRACTIONATED) STARCH BY THE PERIODATE METHOD.

J. Schmorak, D. Mejzler, and M. Lewin.

Institute for Fibers and Forest Products Research

Ministry of Commerce and Industry, Jerusalem, Israel.

J. Polymer Sci. 55(162): 437-442. December 1961.

13-PL-480 SEDIMENTATION OF β -LACTOGLOBULIN A UNDER AGGREGATING CONDITIONS.

Lilo M. Gilbert and G. A. Gilbert.

University of Birmingham, Birmingham, England.

Nature 194(4834): 1173-1174. June 23, 1962.

14-PL-480 STUDIO PRELIMINARE SULLE PROPRIETA' DEL FATTORE DI CRESCITA DENOMINATO "VITAMINA B₁₃." [Preliminary Research on the Properties of a Growth Factor Called "Vitamin B₁₃"]

Alfredo Dansi, Alma Dal Pozzo, Cesare Zanini, and Lucia Rotta.

Scientific Institute of Chemical and Biochemistry, Milan, Italy.

Chim. Ind. (Milan) 44(8): 839-844. August 1962.

- 15-PL-480 A POLYVINYL ETHER CONTAINING SUGAR RESIDUES.
W. A. P. Black, E. T. Dewar, and D. Rutherford.
Arthur D. Little Research Institute
Inveresk, Musselburgh, Midlothian, Scotland.
Chem. & Ind. (London) (36): 1624. September 8, 1962.
- 16-PL-480 SUI FATTORI SCONOSCIUTI DI CRESCITA DEI DISTILLER'S DRIED
SOLUBLES. I. ACCERTAMENTO DELL'ASSENZA DELL'ACIDO OROTICO
NELLA VITAMINA B₁₃. [English summary]
A. Dansi, A. Dal Pozzo, L. Rotta, and C. Zanini.
Scientific Institute of Chemistry and Biochemistry
Milan, Italy.
Boll. Chim. Farm. 101(5): 380-384. [May] 1962.

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U.S. Patent Office, Washington 25, D.C.]

RECOVERY OF AMYLOSE FROM HIGH AMYLOSE CORNSTARCH.

Edna M. Montgomery and Kenneth R. Sexson.

U.S. Patent 3,046,161. July 24, 1962.

Very high yields of almost pure amylose are obtained from "high amylose" cornstarch by solidly freezing and thawing a slurry of the starch before repeatedly extracting with freely boiling buffered water under reflux, centrifuging to remove the amylopectin, and precipitating the nearly pure amylose from the supernatant by holding at 0-2° C.

PROCESS FOR MAKING ERYTHRITOL AND ETHYLENE GLYCOL FROM POLYMERIC DIALDEHYDES.

Felix H. Otey, Carl A. Wilham, and Charles L. Mehlretter.

U.S. Patent 3,046,312. July 24, 1962.

About a 30% improvement in yields of erythritol and ethylene glycol in a simultaneous high-pressure hydrolysis and nickel-catalyst hydrogenation of suspended dialdehyde starch is obtained by adding about 25% based on the reactants of a member selected from the group consisting of activated carbon and kieselguhr.

FAST SURFACE-DRY OIL EMULSION PAINT.

Arthur W. Schwab and Howard M. Teeter.

U.S. Patent 3,047,413. July 31, 1962.

The surface-dry times and corresponding water-resistances of vegetable oil emulsion paints are greatly improved without unduly increasing the viscosities by adding to the unpigmented oil emulsion vehicle about 4% of hydroxyethyl cellulose (based on the water present in the unpigmented vehicle).

SOYBEAN TRYPSIN INHIBITORS AND METHOD OF ISOLATING THE SAME.

Joseph J. Rackis and Allan K. Smith.

U.S. Patent 3,049,530. August 14, 1962.

Two pure trypsin inhibitors are chromatographically isolated from DEAE cellulose containing adsorbed whey proteins by discontinuous elution successively with 0.13M, 0.17M, and 0.25M sodium chloride solutions in phosphate buffer.

PREPARATION OF POLYUNSATURATED FATTY ACIDS.

Robert E. Beal.

U.S. Patent 3,052,699. September 4, 1962.

Highly purified linoleic acid or linolenic acid fractions are obtained respectively from safflower oil-derived and linseed oil-derived fatty acid mixtures by countercurrent centrifugal extraction of 1 part of the respective acid mixture between 15 parts of furfural containing 1-3% water and 3 parts of hexane or iso-octane, the feed components being preheated to about 100° F. and the extractor being cooled externally to maintain the effluent streams at the same temperature.

ATYPICALLY SALT-RESPONSIVE ALKALI-DEACETYLATED POLYSACCHARIDE PRODUCED BY XANTHOMONAS CAMPESTRIS.

Allene R. Jeanes and James H. Sloneker.

U.S. Patent 3,054,689. September 18, 1962.

A 1% aqueous glycerol solution of the subsequently alkali-deacetylated and methanol-precipitated derivative of the native polysaccharide polymer produced by a whole culture fermentation of Xanthomonas campestris NRRL B-1459 forms cast films that are greatly superior to those of corn amylose or of sodium carboxymethyl cellulose in double fold values.

PROCESS FOR PREPARING ISOMALTOL.

John E. Hodge and Earl C. Nelson.

U.S. Patent 3,054,805. September 18, 1962.

O-galactosylisomaltol, a novel intermediate which can be hydrolyzed or pyrolyzed to galactose and isomaltol, is prepared by refluxing lactose or a source thereof and a strongly basic secondary amine in the presence of acetic or phosphoric acid and a tertiary amine buffer, in the further presence of a preferably nontoxic lower alkanol. The intermediate can be incorporated in either raw bakery goods or candy before cooking; the pure isomaltol obtained by hydrolysis of the intermediate and extraction may be directly employed where milder heats are involved.

PROCESS FOR PREPARING POLYSACCHARIDE SULFATES.

Herbert E. Smith and Charles R. Russell.

U.S. Patent 3,057,855. October 9, 1962.

A novel sulfating agent, poly-2-vinylpyridine-sulfur trioxide, having a sulfur content of 16.92% reacts with polysaccharide materials including unmodified starch, hypochlorite-oxidized starch, and wheat flour to form sulfated polysaccharide adducts containing 0.33-1.32% sulfur, said sulfated polysaccharides being further characterized by having improved tensile strengths when employed as adhesives.

METHOD OF PREPARING 14-HYDROXY-CIS-11-EICOSENOIC ACID AND ESTER DERIVATIVES THEREOF.

Cecil R. Smith, Jr., Marvin O. Bagby, and Ivan A. Wolff.

U.S. Patent 3,057,893. October 9, 1962.

The principal constituent fatty acid of the triglycerides comprising the seed oils of the genus Lesquerella has been found to be 14-hydroxy-cis-11-eicosenoic acid, herein named lesquerolic acid. The solvent-extracted glyceride oil was transesterified to form the mixed methyl esters from which methyl lesquerolate was separated and refluxed with ethanolic alkali to form the soap, and the soap acidified with mineral acid to free the lesquerolic acid. Sodium lesquerolate was also pyrolyzed at 255°-350° C. by refluxing with steam under highly alkaline conditions to yield a residue comprising dodecanedioic acid and a volatile fraction comprising octanol-2. The products of this invention have utility as intermediates for the synthesis of coatings, resins, and plasticizers.

WET-STRENGTH PAPER CONTAINING POLYMERIC DIALDEHYDES.

Bernard T. Hofreiter, George Earle Hamerstrand, and Charles L. Mehlretter.
U.S. Patent 3,062,703. November 6, 1962.

Paper products having improved wet-strength and dry-strength characteristics are prepared by incorporating into the pulp as a beater additive from 0.3-1.0% (based on the dry pulp) of dialdehyde starch which has been degraded to a molecular weight of 300,000-5,000,000 by borax or bisulfite.

ALLYLATED DIALDEHYDE STARCH.

Lewis A. Gugliemelli, Gary L. Mayer, and Charles R. Russell.
U.S. Patent 3,063,855. November 13, 1962.

Allylated dialdehyde starch having an average DS of at least 1.6 is prepared by extended 35° C. reaction of allyl alcohol with dialdehyde starch in the presence of a weakly acidic swelling agent. The product dissolved in an organic solvent is a film-former, adhesive, and copolymer for synthetic resins.

FERMENTATIVE PROCESS OF PRODUCING LACTONE OF 2-OXO-6(2-HYDROXYPROPYL)-CYCLOHEXANE CARBOXYLIC ACID.

Chester R. Benjamin, William F. Hendershot, and Clifford W. Hesseltine.
U.S. Patent 3,063,909. November 13, 1962.

Crystals of ramulosin, a novel seed and fungal spore inhibitor having the formula $C_{10}H_{14}O_3$ corresponding to the lactone of 2-oxo-6(2-hydroxypropyl)-cyclohexane carboxylic acid, are obtained essentially from the mycelia of a 3-month fermentation of Pestalotia ramulosa NRRL 2826 at not above 26° C. (preferably at 15° C.) in a 4% malt extract medium also comprising 4% dextrose and 0.1% peptone.

PROCESS FOR MAKING HIGH WET-STRENGTH PAPER CONTAINING POLYMERIC DIALDEHYDE.

Bernard T. Hofreiter, George Earle Hamerstrand, and Charles L. Mehlretter.
U.S. Patent 3,067,088. December 4, 1962.

Improved wet and burst strengths of paper are obtained without alum when a partially depolymerized dialdehyde starch having essentially a molecular size range of 300,000-5,000,000 is added to the pulp along with a cationic starch.

SOYBEAN WHEY PROTEIN-POLYSACCHARIDE COMPLEX.

Arthur C. Eldridge, Arlo M. Nash, and Allan K. Smith.

U.S. Patent 3,069,327. December 18, 1962.

The protein constituents of waste soybean whey are complexed with solutions of polysaccharide gums to provide recoverable proteinaceous complexes comprising high concentrations of lipoxidase.

Similar lists of publication abstracts and patents are available from the other three Regional Utilization Research and Development Divisions of the Agricultural Research Service, U.S. Department of Agriculture. The addresses and fields of research covered are:

<u>Division</u>	<u>Principal Fields of Research</u>
Eastern Utilization Research and Development Division 600 East Mermaid Lane Philadelphia 18, Pennsylvania	Animal products: dairy, meat, fats, and leather; plant products: Eastern fruits and vegetables, tobacco, honey, maple, and new crops; and allergen studies.
Southern Utilization Research and Development Division Post Office Box 19687 New Orleans 19, Louisiana	Cotton and cottonseed; tung fruit; pine gum; Southern fruits and vegetables, including citric, sweetpotatoes, and cucumbers; sugarcane; rice; peanuts; and new crops.
Western Utilization Research and Development Division 800 Buchanan Street Albany 10, California	Western fruits, nuts, vegetables, and rice; poultry products; forage crops; wheat and barley; wool and mohair; sugar beets; dry beans and peas; castor beans; and new crops.

